

Lengthening the Life of Film

(The following article was written by Paul N. Robins of Permafilm, Inc. It first appeared in the December 1957 issue of the Journal of the Society of Motion Picture and Television Engineers. It is here reprinted with permission of that publication and with permission of the author.)

As this issue of the Bulletin went to press, Permafilm had just been adopted by M-G-M. Others making use of it include Revue Productions, National Telefilm Associates, National Broadcasting Company, ABC Film Syndication, Official Films, Television Programs of America, Hollywood Television Service, Consolidated Film Laboratories, Pathe Laboratories and Army Pictorial Center.)

THE mounting cost of film damage is a matter of immediate financial concern to those in the motion-picture and television industry. While a portion of this damage can be attributed to poor or careless projection, or to dirty projectors, an extensive study of the problem indicates that no small part of this damage stems from the chemical and physical characteristics of the film. The damages include scratched emulsion, torn or broken sprockets, brittleness, warping or curling. In the author's opinion, it is the fragile emulsion, and not the film base, which contributes most substantially to the film damage which ensues, and it is the variation in the moisture content of the gelatin which is the root of this problem.

A study of the problem of moisture content has been conducted over many years with the aim of finding a solution or an alleviation for this type of damage. The results of many experiments positively indicate that excessive moisture in the gela-

tin is the cause of "green" film chattering and that it is also the cause of gelatin deposit in the aperture plate. This deposit builds up, burns, and is baked to a hard point which scratches the film.

Probably more damaging than excessive moisture is the reduction or elimination of moisture in the emulsion which takes place when the film is kept in a dry atmosphere or when it is subjected to a high temperature such as that at the aperture plate in the projector. The decrease in moisture content has a tendency to shrink the gelatin. This produces a differential between the dimensions of the base and that of the emulsion and a consequent warping and curling of the film which causes distorted focus and unsmooth projection. This dried-out emulsion also causes brittleness.

It has been recognized that the loss of moisture has contributed, in many cases, to shrinkage of the picture negative, as well as the soundtrack, causing "motor boat" and background noises in the positive prints.

After years of experimentation and many field tests, a product has been developed which radically reduces the various kinds of film damage which can be traced to the variation of the moisture content. This product, Permafilm, is composed of selected nonvolatile organic compounds dissolved in suitable volatile solvents and contains an antistatic agent. It is nonflammable, substantially non-toxic, contains no formaldehyde or other gelatin hardeners, and is not a lacquer or a coating.

Method of Using Compound

This compound is applied to the emulsion side of the film, before or after exposure, or before or after developing,

but in every instance the film must be dry at the time of application. The volatile portions of the compound evaporate rapidly, usually in less than a minute. During this time certain of the nonvolatile components penetrate and impregnate the emulsion, replacing a portion of the moisture in the emulsion while consistently performing the functions of the replaced moisture. The emulsion becomes tough and resilient, with excellent scratch resistance, rather than becoming brittle, as happens when formaldehyde or other chemicals are employed for hardening the emulsion. The nonvolatile materials remain in the emulsion permanently and it becomes seasoned and toughened with permanent pliability. There is no change in the photographic or reproduction quality of the emulsion.

In the continuous motion-picture film developing machine the compound is applied to the emulsion side of the film near the end of the drying cabinet by passing it over a fabric-covered applicator roller and rotating it in a constant-level bath of the fluid at a speed of about 3 rpm. Only the under part of the roller dips in the fluid.

Special machines have been developed to treat films with the compound as a separate operation (Fig. 1). Since these machines treat used film as well as new film, they were designed to first clean all foreign matter from the film, treat it by impregnating the compound into the emulsion and then to give the base side a high polish with a specially impregnated roller to increase slippage and reduce the likelihood of base scratches. These specially designed machines feed the film at variable speeds up to 800 ft/min and a necessary drying space has been provided for the maximum speed.

The antistatic agent in the compound stays on the surface while the solids impregnate the emulsion. Because of this, the antistatic agent can be washed off with carbon tetrachloride, and in the case of the application on undeveloped film, the developing baths wash off or eliminate the antistatic agent which must be subsequently renewed. However, the compound itself which is impregnated into the emulsion cannot be washed off with carbon tetrachloride or other cleaners nor can it be removed by the developing baths. Proof of this can be shown by the use of a scratch test (Fig. 2) outlined on the next page, before and after the developing bath on the impregnated film.

Further studies over the years showed that fading of color in film could be substantially retarded by impregnation of the emulsion layer with these organic chemicals which also have a tendency to stabilize the dyes.

With moisture variation or loss no longer a hazard, brittleness, susceptibility to scratches and abrasions, shrinkage, color fading, and all other forms of film damage normally induced by moisture, are reduced to a negligible minimum. In tropical and damp areas, the growth of fungus and mold is inhibited by the impregnation of the emulsion.

Users of magnetic stripe have found a better adherence of the striping on film treated with this new compound; this is probably due to the reduction of the

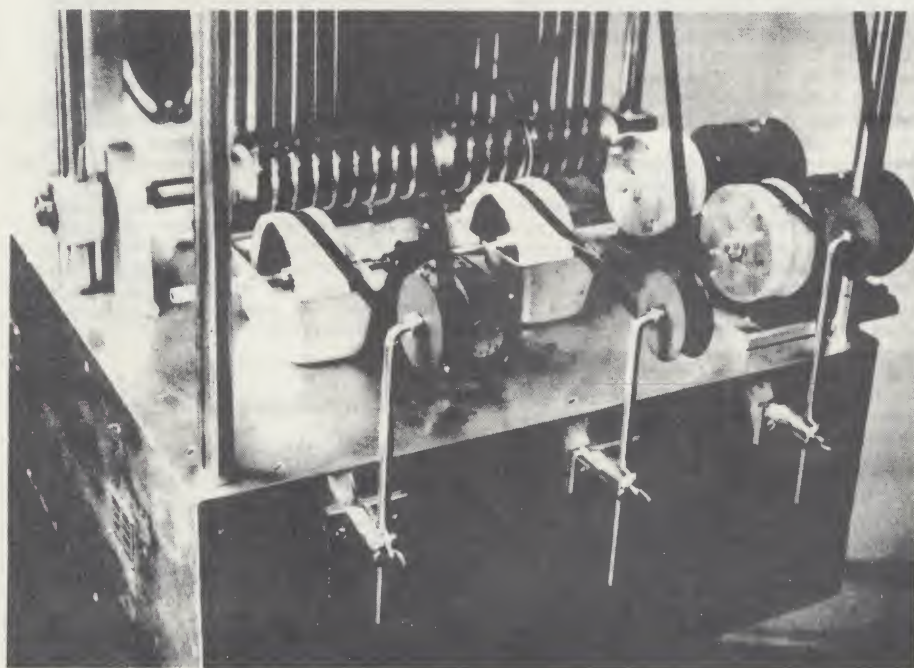


Fig. 1. Machine arrangement for cleaning film and impregnating emulsion with Permafilm compound.

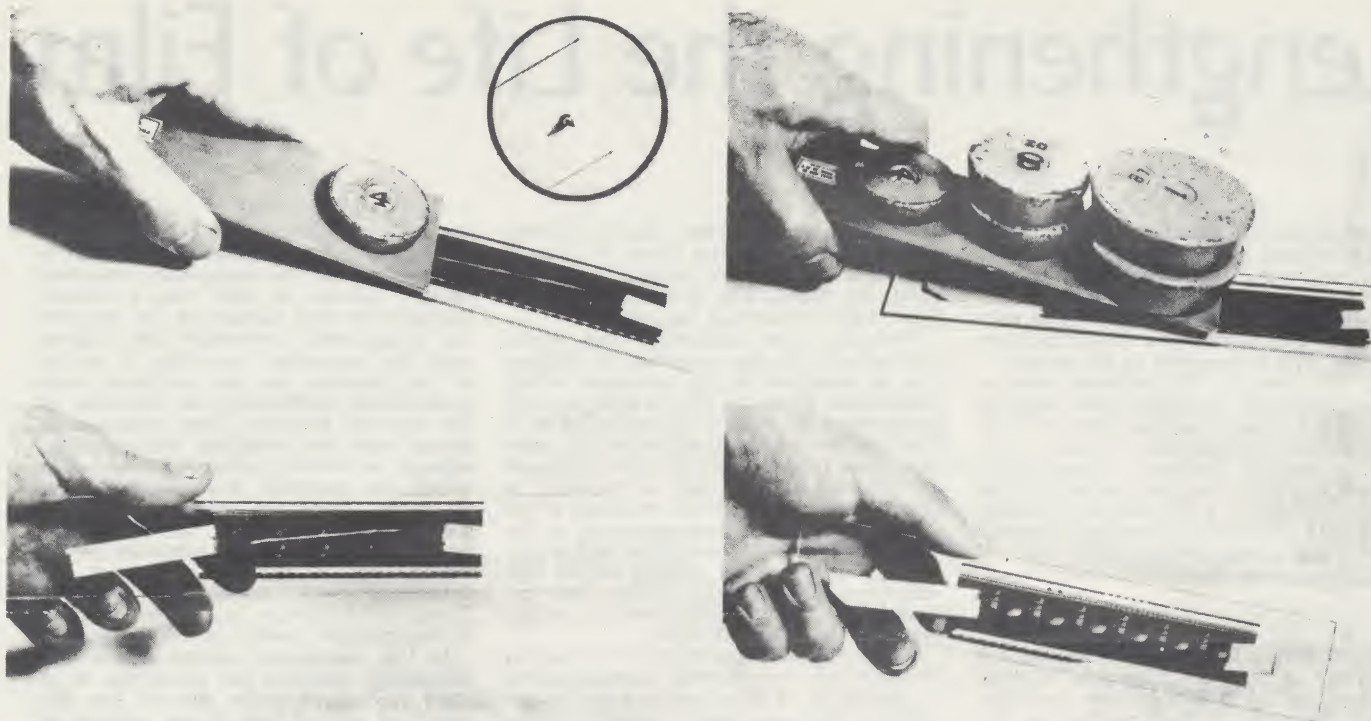


Fig. 2. Upper left: scratch test showing 4-oz weight placed on nail (see insert) drawn across untreated film; lower left: emulsion on untreated film completely removed down to base; upper right: same scratch test as at

upper left, with 52 oz of weight concentrated on nail drawn across; lower right: after scratch test at upper right, emulsion is intact.

moisture in the emulsion that makes it a better base for the adherence of the stripping. Attempts to rejuvenate old shrunken films and negatives by rehumidification, in effect swelling shrunken emulsion back to its original size, have not always been successful. The reason is that the newly introduced moisture in the swollen emulsion has a tendency to disappear very shortly thereafter. By impregnating the rehumidified or swollen gelatin with the compound, which remains there permanently, the shrinkage does not recur, demonstrating that the solids are really impregnated into the emulsion and have become a permanent part of it. The full benefits of the treatment are obtained after a seasoning period of three or four hours.

A survey of chronic film damage, which included a canvass of the larger TV film distributors, revealed that the average print life was only five or six projections before the distributor was compelled to discard a print because of its poor condition. Careful tests of films treated with this compound were made and the records kept by the distributors themselves, and under all field conditions combined experiences showed such prints to have double the life they would formerly have had.

In the face of mounting printing costs, this compound would appear to offer to the film user a method of reducing those costs by lengthening the serviceable life of the film.

Among the tests used to assess the effectiveness of the process were scratch tests and a color test described below.

Tests

Scratch Test No. 1. Two newly developed 35mm films were taped down alongside each other on a glass surface. One of them was untreated and the other piece of film had been treated four hours previously with Permafilm. A thin piece of plywood, through which a blunt nail

had been run (for the purpose of duplicating this test, the point should not be sharp like a diamond but should be rather blunt to simulate a fine rounded ball), and bearing a 4-oz weight, was drawn lengthwise across the emulsion side of the untreated film. The emulsion was scratched down to the base. The operation was repeated on the treated film and the weight increased 4 oz at a time until a scratch really appeared in the emulsion of the treated film. The weight was about eight to ten times that sufficient to scratch the untreated film. Although a slight mark appeared on the treated film during this operation, it was a polishing action and not a removal of the emulsion nor did it show in projection.

Scratch Test No. 2. The above operation was tried before and after the film was placed in the developing baths. The results were the same.

Color Test No. 3. A 5000-candlepower incandescent light was placed about 18 inches above two color slides, one slide treated with Permafilm, the other untreated. Under observation after 15 minutes the untreated slide showed considerable fading, the treated showed no fading.

The test was continued for another 20 minutes. The untreated slide showed much more fading while the treated one showed no fading.

The test then had to be discontinued because the considerable heat caused the slides to smoke.

Case Histories

(1) The Film Syndication Division of a television network concerned with the mounting film damage and rising replacement print costs decided to make a careful survey of four protective methods. Two hundred prints were given this treatment and a like amount were treated by each of three other methods. Records were kept of the condition of each print after each booking. After a six months test, the examination of the records

covering hundreds of prints and thousands of bookings revealed that the prints were capable of no less than twice as many projections under the same conditions as prints treated with other methods, or those untreated. Other distributors report up to three times as many projections on the average.

(2) A very large New York laboratory, after six months of experimentation, equipped its developing machines to impregnate its 16mm and 35mm dupe negatives with this treatment. It was found that, in production or processing, scratches and abrasions were reduced to a minimum which appreciably decreased expensive replacement footage costs. Although the experiments have not been completed, a preliminary report shows that most duplicate negatives treated with this compound yield two to three times as many positive prints as were previously obtained from untreated duplicate negatives.

(3) A report by a large West Coast laboratory after extensive tests on duplicate negatives states: "Our scratch and abrasion problems are now a thing of the past throughout our entire plant where this treatment is presently in use for protecting negatives."

Five More Locals Cited For Donations to COPE

As reported in the Winter issue of the Bulletin, 33 locals of the Alliance had by that time received Honor Award Certificates from the AFL-CIO Committee on Political Education, recognizing individual COPE contributions equalling one dollar per member.

Since the Winter issue went to press, COPE awards had been received by five more I.A. locals: No. 20, St. Paul, Minn.; 47, Pueblo, Colo.; 110, Chicago, Ill.; 320, Savannah, Ga.; and 608, Boulder, Colo.

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June 20, 1967

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Permafilm Corp. of Florida Inc.
Mr. Edward Galliers
137 S.E. 15th Avenue
Boynton Beach, Florida

Dear Mr. Galliers,

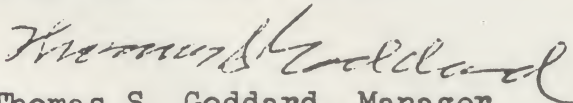
Just a personal note to express my appreciation
for your prompt and efficient service in cleaning,
Permafilm and Perma-New treatment of our films
for the last two years.

The results of the treatment process has been
evident in the usefulness of the films. We have
been able to furnish the schools with a finer
quality film, which prolonged the life of many
films that would otherwise have to be replaced.

We wish to advise that we have recommended the
continued use of your service for the new films
we will be purchasing for the next school year.

Very truly yours,

AREA MATERIALS CENTER


Thomas S. Goddard, Manager



United States Testing Company, Inc.

HOBOKEN, N. J. 07030

201-792-2400

REPORT

NUMBER

91246

(Refer to this number)

February 6, 1967

Client: PERMAFILM INCORPORATED
257 Park Ave. South
New York, New York 10010

Subject: Scratch and abrasion test of treated and untreated 16 mm motion picture film.

Two reels of 16 mm motion picture film was received at the United States Testing Company Inc., and identified by the Client as:

1. Untreated 16 mm movie film.
2. 16 mm movie film treated with Perma Film Protection.

Project:

The purpose of the test is to show, by visual examination, the scratch and abrasion resistance superiority of the treated Perma film against the untreated film.

Procedure:

The Perma treated film and the untreated film were spliced to make a seven and one half foot loop and projected on a Bell and Howell model 302 sound projector. The film loops were run through the projector for 300 times. Each film was inspected at the 100, 150 and 200 cycle mark.

The projector film gate was cleaned at the start of each film but not during the 300 cycle periods.

After 300 cycles the films were microscopically inspected.

Results:

At the 100 cycle mark, scratches or abrasion streaks began to appear on the untreated film. The scratches or abrasion marks did not appear on the Perma treated film until the 200 cycle period.

United States Testing Company, Inc.

Client: Permafilm Incorporated

Number

91246

Examination at the 300 cycle period showed that there was less abrasion on the Perma treated film than the untreated film. Picture quality of the films projected on the screen revealed that the Perma treated film was more clear and had less scratches than the untreated projected film.

Comments:

From the tests conducted, it is our opinion that the film treated with Permafilm helps prevent scratches and abrasion marks and is more plyable when run through a motion picture projector.

* * * * *



MPO VIDEOTRONICS, INC. • 222 EAST 44TH STREET • NEW YORK, N.Y. 10017 • TEL. (212) 867-8200 • CABLE "EMPOCORPO, NEW YORK"

August 15, 1966

Permafilm Incorporated
79 Fifth Avenue
New York, N. Y. 10003

Gentlemen:

Producing almost \$20,000,000 worth of industrial, commercial and television films for a great many advertisers, does not leave us too much time to do some of the things that we would like to do. However, we do want to take the time to tell you how pleased we and our clients are with the Perma Film Protection of their industrial prints.

Some time ago we became aware of the fact that after a great deal of time and money were spent to present the sponsor's message with maximum effect, this effect was being diminished by scratchy prints circulating in the field.

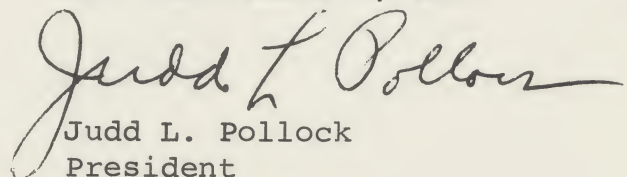
Since our interest in the advertiser's welfare did not end with the delivery of the negative or the prints, we made very exhaustive study of all of the film protection methods on the market, and their effectiveness.

For the past three years, as standard procedure, we have had all of our sponsored-film release prints treated with Perma Film Protection, and we are glad to say that the response from our clients has been most enthusiastic.

We regard Perma Film Protection as one of the major contributions to the motion picture industry.

Sincerely,

MPO VIDEOTRONICS, INC.


Judd L. Pollock
President

NEW YORK / DETROIT / CHICAGO / HOLLYWOOD

AMERICAN FILM PRODUCTIONS
INCORPORATED

May 11, 1965

Mr. Paul N. Robins
Permafilm Incorporated
79 Fifth Avenue
New York 3, New York

Dear Mr. Robins:

It was very nice seeing you at the SMPTE convention in Los Angeles. My conscience has been bothering me ever since, because I never told you what a great job Permafilm had done for us over the past five years.

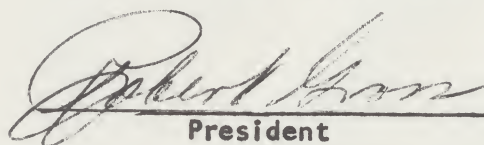
As you probably know, we first recognized the Perma Film Protection when our internegatives and dupe negatives were given this treatment by Consolidated in Hollywood. These negatives were able to make many more quality prints than we were accustomed to getting in the East. As a result, we insisted on Perma Film Protection for our printing negatives here in the East as well.

At one laboratory, for example, the number of quality color prints from one internegative jumped from an average of 40 to an average of 180 as soon as the system of treating the negatives was started. When you consider the fact that this includes negatives which had to be retired because of rips, pulled perforations, and damage of that type, you can see what a tremendous benefit was involved. Not only did it save cold cash, but it also saved all the time required to check answer prints, corrected prints, etc.

When your Perma New Rejuvenation process came out, we tried that. It was so successful that we recommend it regularly to all our clients and customers. This treatment is particularly valuable in the case of some of our films; like RESCUE BREATHING, WATER RESCUE, POLE TOP RESCUE, etc; which are screened until the film literally disintegrates. Since we have used the Perma New Rejuvenation process for badly scratched prints, we have virtually doubled and tripled the number of good screenings available from each print.

Sincerely yours,

AMERICAN FILM PRODUCTIONS


President

Robert Gross:b



IBM World Trade Corporation 821 United Nations Plaza, New York 17, N. Y.

Murray Hill 6-4000

Cable Address: INBUSWORLD

April 8, 1965

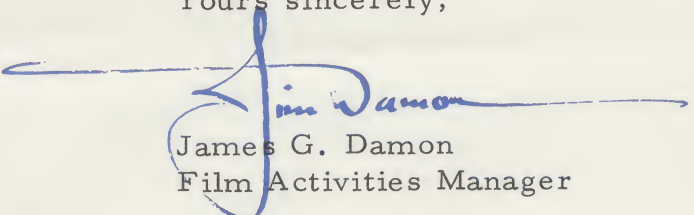
Mr. Paul Robbins
Permafilm, Inc.
79 5th Avenue
New York 3, New York

Dear Paul:

I should like to commend Permafilm for the excellent job your people did in restoring our print of "The Question Tree". This film was so badly scratched that I was on the verge of having it scrapped. I screened it following your rejuvenation process, and it is as good as new.

For your information, I have requested Ted Fogelman at CFI to "permafilm" all new prints of ours coming out of their lab until further notice.

Yours sincerely,



James G. Damon
Film Activities Manager



ASSOCIATION FILMS, Inc.

Established 1911

Executive Offices
347 MADISON AVENUE
NEW YORK 17, N. Y.
MUrray Hill 5-2242

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July 11, 1963

Mr. Paul N. Robins, President
Permafilm Incorporated
79 Fifth Avenue
New York 3, New York

Dear Mr. Robins:

When an organization like ours distributes over 100,000 prints through five branches, to schools, colleges, churches, business clubs, and various other groups, we naturally run up against all kinds of film damage. While we take great pride in our film maintenance, so that our scores of users will benefit from the best possible projection quality, we found some years ago that the damage factor was definitely on the increase. Since this necessitated obtaining new prints from our clients, as well as keeping prints "on the shelf" inactive, while awaiting replacement footage, it became apparent to us that some solution would have to be found to reduce this damage factor, and keep the cost of print distribution down for our clients.

We made a very exhaustive study and field test under all conditions of what was available in the form of film preservation for new prints in order to lengthen their lives, and for some satisfactory form of film rejuvenation, so that prints which would normally be marked for discard, because of poor condition, could be put back into profitable service.

Very careful and voluminous statistics were compiled, and the results were so overwhelmingly convincing in favor of your processes, that we applied for a Perma Film Protection-Perma New Rejuvenation In Plant Franchise, so that we could give all of our prints the benefits of your processes right on our premises. We then notified our clients of the results of the tests, and left it to them to decide if they wished to have us use your processes on their prints which we distributed. Their reaction to our suggestion can be seen in the fact that our Perma Film-Perma New equipment keeps running as much as 24 hours a day, for long stretches.

Our clients are pleased because they have sharply reduced the cost of print distribution, and we are pleased because the inactive prints have been reduced to a minimum.

Very sincerely yours,

ASSOCIATION FILMS, INC.

Robert D. Mitchell, President

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Council for Financial Aid to Education
European Community Information Service
Girl Scouts of the U.S.A.
Governmental Affairs Institute
National Aeronautics & Space
Administration
National Board of Y.M.C.A.s
National Council of Catholic Men
National Council of the Churches of
Christ in the U.S.A.
National Safety Council
Salvation Army
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THE *Safe* FILM PRESERVER



CONTAINS

NO

**Lacquer
Wax
Formaldehyde
Silicone**

Perma-Film Protection is **Preventive Film Maintenance** which needs no renewing! It is not a surface treatment which can be washed off with solvents. It is the only known treatment which impregnates itself into unexposed emulsion, and which will not wash out in the subsequent development bath!

Perma-Film Protection is used in twenty-one countries around the world by thousands of internationally known film users and governmental agencies such as U. S. Army, Navy, Marine Corps, Air Force, Dept. of Health, Education & Welfare, Cape Canaveral Missile Base, Metro-Goldwyn-Mayer, Nestle, Sikorsky Aircraft, Rockefeller Institute, and five foreign governments, and many photo-finishers and photo-engravers.

Reduce your print costs by getting more projections; guard your valuable negatives from scratches and brittleness — through Perma-Film protection.

PERMAFILM, INC.

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NEW ADDRESS & PHONE:

**257 PARK AVENUE SOUTH
NEW YORK, N. Y. 10010**

674-5700

NEW, AMAZING



SCRATCH REMOVAL SYSTEM

Dr. Lawrence L. Steele, spent six years in the development of Perma-New Scratch Removal System, due to dissatisfaction with other methods of film scratch removal which grind down the base of the film.

This is a unique chemical treatment of both the emulsion and base sides of scratched film which makes most normal scratches invisible when projected. It has been widely adopted in twenty-one countries around the world.

You can use Perma-New Scratch Removal System to put back into useful life, your scratched prints which normally you would have to replace at a greater cost.

Make an inventory of your scratched prints and have them Perma-New treated without delay. A sample reel will be treated without charge.

AUTHORIZED FRANCHISERS

The Safe FILM PRESERVER



Protects photographic film against

1. Scratches
2. Warping or Curling
3. Brittleness
4. Adherence of Dust and Dirt

Perma-Film Protection is a **ONE-TIME** protective treatment of photographic emulsion on negatives and positives through impregnation with stable organic chemicals which toughen but do not harden the emulsion. The preserved, stabilized emulsion becomes resilient, *permanently* pliable, and resistant to scratches, abrasions, shrinkage, drying out and the other usual forms of damage. Storage of film under expensive moisture controlled conditions, now becomes unnecessary. Anti-static properties of the treatment repel dust and dirt.

Perma-Film Protection should not be confused with removable coatings, such as wax, which attracts dust; silicones, or lacquers which contribute to warping; or formaldehyde hardeners which make emulsion brittle.

The film base receives a high polish with Perma Base chemicals increasing slippage and reducing the possibility of base scratches.



BULLETIN

Issued from time to time by Permafilm Inc., 79 Fifth Ave., New York 3, N. Y., U. S. A.

Effective Date: May 1, 1966

TREATMENT & SERVICES PRICE LIST

<u>Positive Prints</u>	<u>16MM</u>	<u>MIN. INV.</u>	<u>35MM</u>	<u>MIN. INV.</u>
<u>PERMAFILM PROTECTION</u> ----	\$1.60 per M Ft.	\$10.00	\$2.70 per M Ft.	\$10.00
<u>PERMA NEW REJUVENATION</u> --	\$8.50 per M Ft.	\$25.00	\$13.50 per M Ft.	\$25.00
Includes: Ultrasonic Cleaning, Rejuvenation of Scratched Base & Emulsion plus Lubrication				
<u>PERMAFILM REHUMIDIFICATION</u>	\$3.50 per M Ft.	\$10.00	\$6.00 per M Ft.	\$10.00
Includes: Correction of Brittleness & Curl, Stabilization of Emulsion, Ultrasonic Cleaning & Permafilm Protection				
<u>PERMA NEW REHUMIDIFICATION</u>	\$12.00 per M Ft.	\$25.00	\$17.50 per M Ft.	\$25.00
Includes: Correction of Brittleness & Curl, Ultrasonic Cleaning Rejuvenation of Scratched Base & Emulsion plus Lubrication				
<u>ULTRASONIC FILM CLEANING</u>	\$1.25 per M Ft.	\$5.00	\$2.00 per M Ft.	\$5.00
<u>LUBRICATION ONLY *</u>	\$1.00 per M Ft.	\$5.00	\$2.00 per M Ft.	\$5.00
* (Ultrasonic Cleaning will be required for most Lubrication Orders)				

ADDITIONAL RATES

Master Material --- All Master Material, Negatives, Originals etc., are
subject to inspection and special rates.

SERVICE RATES

INSPECTION & REPAIR

Detail Inspection - Includes written report and/or Repair and/or Screening
\$8.50 per hour.

General Inspection - (No Repair or written report) \$1.25 per flat or less.

NOTE All films sent for Perma New Rejuvenation will be generally inspected
and minor repair work (three (3) splices or less) will be made at no addition-
al charge.

Winner of The Presidential E



RUSH & OVERTIME WORK subject to special rates.
Award for Excellence in President's Export Expansion Program